

2 The Nature of Pain: A Conceptual Perspective

While pain is best known and characterized as a subjective phenomenon, the nature of pain may also encompass a more global, conceptual view of pain. This view provides a way of conceptualizing the complex phenomenon of pain and guiding a better understanding of it. In this perspective, the important point is that pain is not just a physical sensation or psychological event, but a combination of these and other components.

The word determinant has been used in relation to components comprising the nature of pain, as when Melzack and Casey (1968) referred to the sensory-discriminative, motivational/affective, and cognitive determinants of pain. They believed pain to be “a function of the interactions of all three determinants, which cannot be ascribed to any one of them” (1968, p. 434). Thus, pain was the result of multiple, interactive, and probably integrated processes.

Ahles, Blanchard, and Ruckdeschel (1983) developed the idea of determinants of pain into a conceptualization of cancer-related pain as a multidimensional phenomenon. Their work introduced the idea that an individual’s pain is comprised of multiple dimensions that overlap yet have distinct components. In this context, the word dimension is not used to connote a highly quantifiable entity as it does when used in the context of measurement theory, but rather to characterize a general component or trait. Ahles and his colleagues (1983) viewed the dimensions of pain as contributing in an integrated way to individuals’ perceptions of, and responses to, pain. Although their framework was proposed to explain cancer pain, the dimensions may apply very easily to other types of pain, especially those associated with chronic medical illness.

An adaptation of this multidimensional conceptualization of pain is the conceptual perspective used in this report to organize the work of the panel. The purpose of this chapter is to describe this multidimensional perspective and its implications for assessing and managing pain. Following brief discussions of classical and current theories of pain and how they contributed to the development of the conceptual perspective, the state of the science relative to each dimension of pain is reviewed. Then implications of the multidimensional perspective for assessing and managing pain are discussed. At the conclusion of

the chapter, research needs and opportunities relative to the conceptual perspective are identified, and recommendations are made for future research.

Theories of Pain

Two traditional and opposing schools of thought on the nature of pain comprise the classical theories, which have dominated western culture over the last century. The specificity theory (Muller, 1942; von Frey, 1895) proposed that pain was a specific entity, similar to the senses of sight or olfaction. As a specific entity, pain had its own peripheral and central nervous system components. Pain was believed to be only one of four cutaneous stimuli, the others being warmth, cold, and touch. Thus, the theory proposed that specific cutaneous pain receptors projected to a specific pain center in the brain. Although this perspective was an oversimplification of the pain experience, two principles persist: 1) peripheral receptors are specialized in their response to stimuli; nociceptors are peripheral receptors that respond optimally to noxious (i.e., painful) stimuli; and 2) the eventual central nervous system destination of peripheral nerves and their ascending pathways is a key to distinguishing the type of peripheral stimulation that occurred (Price, 1988).

The pattern theory, on the other hand, proposed that specific nerve fibers or receptors for pain did not exist. Rather, free nerve endings responded nonselectively to multiple stimuli (Weddell, 1955), and their responses took the form of different patterns of impulses. Responses with increasing impulse frequencies were associated with painful stimuli. Support for this theory is evident in the work of investigators who, using microneurographic techniques, have correlated impulses from afferent nerves with sensations (Hagbarth & Vallbo, 1968; Vallbo & Hagbarth, 1968). Researchers have demonstrated a relationship between qualitative aspects of pain (such as pricking, burning, cold pain, or hot pain) and frequency and amplitude of impulses in afferent fibers (Hagbarth, 1979; Ochoa & Torebjork, 1980; Yarnitsky & Ochoa, 1990, 1991a, 1991b). Thus, the idea that afferent impulses are critical in the perception of pain persists; these impulses are part of the central processing mechanisms that result in the perception of pain (Wall & McMahon, 1986).

Two other theories advanced in the twentieth century incorporated aspects of the specificity and pattern theories and propose additional mechanisms of pain perception. Livingston (1943) proposed in the summation theory that chronic pathological pain syndromes could be triggered by brief painful episodes and become longstanding due to reverberating circuits in the dorsal horn of the spinal cord. Such syndromes included postherpetic neuralgia and phantom limb pain. The theory viewed dorsal horn circuits as closed loops of neurons that became active following damage to peripheral nerves. Price (1988) noted that some elements of this theory have been substantiated. For example, following initial noxious stimulation of peripheral nerves, after-discharges may persist in spinothalamic neurons and cause after-sensations that are perceived as painful.

Closely related to the summation theory is the sensory interaction theory, which proposed that a specialized system controlled input and, under normal circumstances, prevented summation from occurring. A rapidly conducting system was viewed as capable of inhibiting synaptic transmission in a more slowly conducting nociceptive system. When this inhibition occurred, pathological pain syndromes resulted; for example, diffuse burning pain. Research on specific types of neuronal interaction supports this theory, including the important interactions between large myelinated nerve fibers and small unmyelinated nerve fibers to determine both presence and severity of pain in persons (Price, 1988).

The most influential current theory of pain is the Gate Control Theory (Melzack & Wall, 1965). This theory attempted to synthesize some features of preceding theories and explain other clinical phenomena such as phantom limb pain. The theory proposed that: 1) a modulating (gating) mechanism existed in the dorsal horn and involved central neural factors; 2) the gating mechanism was influenced by relative activity in large-diameter fibers which "closed" the gate and small-diameter nerve fibers which "opened" it; 3) nerve fibers descending from the central nervous system influenced the gating mechanism, possibly in conjunction with psychological and cognitive factors; 4) a central control trigger system selectively activated cognitive processes that influenced the gating mechanism's modulatory properties through descending fibers; and 5) an action system composed of "neural areas that underlie the complex, sequential patterns of behavior and experience characteristic of pain" was activated when dorsal horn transmission cells exceeded a critical level (Melzack & Wall, 1983, p. 227).

Although the Gate Control Theory initially was based on data from neurophysiologic experiments in cats, basic and clinical researchers have studied it intensively in both laboratory and clinical situations. Price characterized the theory as "...an excellent first approximation of the neural mechanisms underlying the transmission of nociceptive information" (1988, p. 221). A major contribution of this theory is its influence on the perspective of pain as a multi-dimensional experience with physical and psychological components. Melzack and Casey (1968) developed the theory further to explain three determinants -- a sensory-discriminative component, an affective-motivational component, and central nervous system processing--that interact to produce the overall "experience" of pain.

Price (1988) developed the sequential processing theory as a modification of the Gate Control Theory, proposing that the affective/motivational state was dependent on sequential processes involving cognitive mechanisms. In this view, cognitive appraisal of the meaning of sensory-intensive and contextual factors has a direct causal relationship to affective reactions to pain (Price, 1988).

Much research on current pain theories focuses on the complex biochemical, neurobiologic, and neurophysiologic mechanisms responsible for sensory (physical) aspects of pain perception and response (Fields, 1987). Rapidly accumulating evidence, however, clearly indicates that human pain perception and response are influenced by emotional components (also called psychological or affective aspects of pain, depending on the source). These emotional components are inherent in the now accepted view of pain and help form the basis of conceptual frameworks for understanding the nature of pain.

Multidimensional Views of Pain

The sensory and emotional aspects of pain referred to in the IASP definition of pain (1979) are relevant to, and complement, the interactive processing determinants of pain described by Melzack and Casey (1968). In addition, these sensory and emotional aspects and determinants, which are derived from the ideas of the Gate Control Theory of Pain, contributed to the subsequent development of multi-dimensional conceptual models of pain.

Loeser (1982), for example, described a conceptual model of chronic pain that consisted of four components: nociception, pain, suffering, and pain behavior. Although this model consists of sensory and emotional aspects, it does not specifically address other

factors that influence pain, such as cognitive and sociocultural variables. Further, its focus on chronic pain may limit its usefulness for other types of pain.

Ahles and colleagues (1983) developed a multidimensional conceptualization of cancer pain, including five dimensions: 1) physiological (organic etiology of pain); 2) sensory (intensity, location, quality); 3) affective (depression, anxiety); 4) cognitive (influences of pain on thought processes, meaning of pain); and 5) behavioral (behaviors used to express and/or control pain). Ahles and colleagues (1983) confirmed these five dimensions in their study of 40 cancer patients with pain by measuring aspects of the dimensions, for example depression and anxiety reflecting the affective dimension, or meaning of pain which is part of the cognitive dimension. McGuire (1987a) confirmed these dimensions in a similar study, and proposed a sixth dimension, sociocultural (McGuire, 1987b). This dimension includes demographic, social, cultural, and familial views people hold about pain that may govern their beliefs and attitudes. This conceptualization of pain as a phenomenon comprised of six dimensions (Table 2.1) may apply to many types of pain. Viewed from this multidimensional perspective, pain is one of the most complex and challenging clinical phenomena encountered by health care providers.

State of the Science

The state of the science provides substantiating evidence for the six dimensions in the multidimensional conceptualization of pain. Through review of this evidence, implications of the conceptual framework for pain assessment and management become apparent, providing a foundation for the reviews in subsequent chapters.

Physiological Dimension

This dimension encompasses the physical, neurologic, and biochemical aspects of pain. Although this dimension is inherent in tissue damaging pain from known causes, the absence of a clearly identifiable organic cause of pain does not preclude the relevance of the dimension. The IASP (1986) cautioned that any pain *described* as similar to the pain caused by damage to tissue *is* pain. Two areas are integral to this dimension.

The first consists of the basic anatomic structures and physiological mechanisms involved in pain perception and response. The processes of transduction, transmission, perception, and modulation are important here, and include specific components such

as nociceptors, ascending and descending transmission systems, and neurochemical mediators. Knowledge of these processes is essential for scientists studying pain and its prevention and management. Several recent volumes provide both detail and additional references (Fields, 1987; Price, 1988; Wall & Melzack, 1989).

The second general component of this dimension consists of specific types and syndromes of pain. Types of pain are derived in part from duration and temporal patterns of pain, two concepts that are interrelated. It is important to note that duration and pattern of pain are inherent in the physical, tissue damaging aspects of pain with known etiology, but also exist in the absence of a clearly identifiable cause of pain.

Duration is the primary distinguishing characteristic between acute and chronic pain. Temporal patterns of pain such as brief, momentary, or transient; rhythmic, periodic, or intermittent; and continuous, steady, or constant (Melzack, 1975) are descriptors that may also differentiate acute and chronic pain. Additionally, these descriptors are also indicators of the etiology of pain. For example, the pain caused by sticking oneself with a pin will be brief, transient, and acute, while pain due to impingement of tumor on a vital organ may be continuous, constant, and chronic.

In some diseases, such as cancer, types of pain based solely on etiology have been identified (Coyle & Foley, 1987; Foley, 1979). For example, pain may be disease-related (caused by tumor) or treatment-related (caused by therapeutic modalities such as surgery or chemotherapy).

Types of pain have been delineated more specifically as syndromes of pain. For example, the IASP (1986) published an extensive taxonomy of chronic pain syndromes. As another example, cancer-related pain caused by tumor consists of several specific syndromes, each with its own mechanisms and anatomic locations (Payne, 1989). Somatic pain may be superficial (cutaneous) or deep (connective tissue, muscle, bone, joints). Visceral pain affects visceral tissues or hollow viscus organs.

Neuropathic pain may be central or peripheral in origin, and affects specific innervated areas. Cancer-related pain due to diagnostic or treatment procedures has been equally well described in terms of specific syndromes, for example, post-thoracotomy syndrome (Chapman, Kornell, & Syrjala, 1987).

Heye (1991) applied the notion of specific syndromes of pain to individuals having coronary artery bypass surgery. Detailed descriptions of pain in this population were provided, including superficial (cutaneous) and deep (fascia, muscle, peritoneum) somatic and visceral pain syndromes observed post-operatively and interpreted as due to the surgical procedure. In addition, postoperative complications associated with pain were described and the importance of recognizing multidimensional aspects of pain was highlighted.

Individuals with pain may have multiple types of pain and pain syndromes that vary over time. For example, an arthritis patient may have acute episodic pain associated with joint flare-ups that overlays chronic pain. An elderly diabetic may have diabetic neuropathy, pain from peripheral vascular disease, and pain due to arthritis. A cancer patient may have acute postoperative pain, somatic pain from bone metastases, and visceral pain from abdominal organ involvement. Thus, this aspect of the physiological dimension--types and syndromes of pain--is complex and clinically salient.

A substantial body of research documents this dimension of pain in a variety of patient populations and clinical settings. Specific studies include hospitalized medical and surgical patients (Donovan, Dillon, & McGuire, 1987); patients with acute post-operative pain (Heye, 1991; Melzack, Abbott, Zackon, Mulder, & Davis, 1987; Puntillo, 1990); patients with burn injuries (Choiniere, Melzack, Rondeau, Girard, & Paquin, 1989); cancer patients with tumor- and treatment-related cancer pain (Arathuzik, 1991; Chapman, Kornell, & Syrjala, 1987; Coyle & Foley, 1987; Foley, 1979; Graham, Bond, Gerkovich, & Cook, 1980; McGuire, 1984, 1987a; Nicholson, McGuire, & Maurer, 1988; Payne, 1987, 1989; Portenoy, 1989; Schreml, 1984); patients with myocardial infarction (Hofgren, Bondestam, Gaston-Johansson, Jern, Herlitz, & Holmberg, 1988; Solomon, Lee, Cook, Weisberg, Brand, Rouan, & Goldman, 1989); and persons with sickle cell crisis (Cox, 1984; Platt, Thorington, Brambilla, Milner, Rosse, Vichinsky, & Kinney, 1991). The results of these studies indicate that specific etiology, duration and temporal patterns, and other manifestations of pain such as the elevated vital signs observed with acute pain are dependent on the individual disease process, and may vary considerably among disease entities.

Sensory Dimension

The sensory dimension addresses where pain is and what it feels like. Three specific concepts are location, intensity, and quality. Anatomic location of pain may give clues about etiology and sensory aspects. For example, poorly localized pain in the abdominal

region of patients with cancer probably is visceral in origin (Payne, 1989). In contrast, acute postoperative pain in the region of the incision is usually well localized.

Intensity is the amount of pain perceived by the individual and often described with words such as mild, moderate, severe, excruciating, or intolerable or with numbers representing amounts of pain. Intensity may be influenced by etiology, tolerance, and an individual's pain threshold, which itself may be affected by factors such as physical comfort, fatigue, mood, medications, social environment, or others (Twycross & Lack, 1983).

Finally, quality is how pain actually feels. Persons with pain of different etiologies may use different descriptive words (Dubuisson & Melzack, 1976), indicating that specific types of pain are characterized by specific sensory qualities. Examples of such qualities are sharp, tender, aching, throbbing, sore, stabbing, heavy, shooting, burning, or gnawing. These qualitative descriptors also have been associated with specific pain syndromes. For instance, visceral pain tends to be dull, heavy, and aching, while somatic pain may be sharp and stabbing in nature (Payne, 1989).

A significant body of literature supports the sensory dimension. Research efforts focus on location, intensity, and quality of pain in a variety of patient populations and clinical settings. Specific pain syndromes include general medical and surgical pain (Burge, Eichhorn, DeStefano, Foley, Hoothay, & Quinn, 1986; Burns, Hodsman, McLintock, Gillies, Kenny, & McArdle, 1989; Carr, 1990; Donovan, Dillon, & McGuire, 1987; Fraser, Hotz, Hurtig, Hodges, & Moher, 1989; Melzack, 1975; Melzack et al., 1987; Paice, Mahon, & Faut-Callahan, 1991; Volicer, 1978; Winefield, Katsikitis, Hart, & Rounsfall, 1990); burn pain (Perry, Cella, Falkenberg, Heidrich, & Goodwin, 1987); cancer pain (Arathuzik, 1991; Bressler, Hange, & McGuire, 1986; Donovan & Dillon, 1987; Graham et al., 1980; McGuire, 1984; Nicholson et al., 1988; Twycross & Fairfield, 1982; Zimmerman, Duncan, Pozehl, & Schmitz, 1987); pain due to myocardial infarction (Hofgren et al., 1988); gynecologic pain (Newton & Reading, 1980); pain associated with sickle cell disease (Cox, 1984; Platt et al., 1991); pain related to neurological conditions (Davar & Maciewicz, 1989); and pain in patients admitted to critical care units (Puntillo, 1990).

Thus, support for the sensory dimension of pain is strong. It is probably present in all pain states, and is certainly the most well understood dimension. Clinically, the sensory dimension is extremely salient; when providers elicit reports of pain, patients generally mention location, intensity, and quality.

Affective Dimension

The affective dimension encompasses emotional responses to pain. This dimension may be manifested as depression, anxiety, anger, agitation, irritability, mood changes, anticipation, relief, or other factors, and may also be related to personality traits (Ahles et al., 1983). While most affective responses might be considered negative (e.g., anxiety), in some instances positive responses might occur (e.g., anticipation or relief when labor pain begins). In addition, the affective dimension may be quite complex. For example, Saunders (1967) coined the term “total pain” to emphasize the emotional complexities in cancer pain. Twycross and Lack (1983) elaborated on this idea by describing pain as a somatopsychic experience with many non-physical factors that modify perceptions of pain. They cited depression, anger, and anxiety in particular, with specific problems such as a sense of helplessness, worries about family or finances, and uncertainty that contribute to “total pain.” Suffering, a complex phenomenon broader than unbearable physical pain in and of itself, also may be an important component in this dimension (Cassell, 1989; Copp, 1990a; 1990b; Martin, 1989).

A number of studies indicate that a strong affective component associated with some diseases, such as cancer, influences both perception of and response to pain. The relationships among pain and these factors, however, are not clear. For example, does depression in a cancer patient exacerbate pain or does pain exacerbate depression? (Ahles et al., 1983; Lansky, List, Hermann, Ets-Hokin, DasGupta, Wilbanks, & Hendrickson, 1985). As another example, an ongoing controversy focuses on whether the chronic pain syndrome of fibromyalgia is related to major affective disorder, specifically depression. Some investigators have demonstrated a positive relationship (Hudson, Hudson, Pliner, Goldenberg, & Pope, 1985; Hudson & Pope, 1989); others have failed to show a positive relationship (Kirmayer, Robbins, & Kapusta, 1988).

Researchers have conducted descriptive studies on affective or emotional aspects of pain (Craig, 1984; Walding, 1991). Others conducted descriptive correlational research examining relationships between components of the affective dimension and pain. Specific populations of patients include hospitalized patients (Volicer, 1978); persons with acute postoperative pain (Scott, Clum & Peoples, 1983; Taenzer, Melzack, & Jeans, 1986; Wallace, 1985); those with pain due to burns (Choiniere et al., 1989; Perry et al., 1987); and patients with cancer-related pain (Ahles et al., 1983; Arathuzik, 1991; Bond, 1973; Bond & Pearson, 1969; Cleeland, 1984; Cohen, Brechner, Pavlov, & Reading, 1986; Dalton & Feuerstein, 1988; Dalton, Toomey,

& Workman, 1988; Dorrepaal, Aaronsen, & van Dam, 1989; Ferrell, Wisdom, & Wenzl, 1989; Fotopoulos, Graham, & Cook, 1979; Glynn, 1980; Jacox & Stewart, 1973; Lansky et al., 1985; McKegney, Bailey, & Yates, 1981; Shacham, Reinhardt, Raubertas, & Cleeland, 1983; Spiegel & Bloom, 1983; Woodforde & Fielding, 1970).

Research in patients with pain due to surgery, burns, and cancer substantiates the affective dimension. Because fewer researchers have attended to the affective dimension of pain in other populations of patients, less is known about it than about the physiologic and sensory dimensions. The extent to which this dimension reflects pain as opposed to previous life experiences is largely unknown.

Cognitive Dimension

The cognitive dimension of pain encompasses the way in which pain influences an individual's thought processes, the individual's perception of self, ascription of meaning to pain, coping strategies, attitudes and beliefs about pain and treatments, knowledge, preferences, and factors that influence pain. Ahles and his colleagues (1983) were among the first to systematically study this dimension in a cancer patient population.

While a number of components contribute to this dimension, research has addressed only some of them. A few areas of investigation are highlighted here. The meaning ascribed to pain may influence responses to it. Ahles and colleagues (1983) and McGuire (1987a) demonstrated that patients with cancer-related pain who associated pain with the progression of their disease were more depressed than those who did not. Barkwell (1991) reported that cancer patients with pain ascribed meanings of challenge, punishment, and enemy to their pain. Those who viewed pain as challenge had lower pain scores, lower depression scores, and higher coping scores than those viewing pain as punishment or enemy.

An extensive body of work has examined cognitive coping strategies that patients in pain from various causes employ to help them decrease or control their pain (Copp, 1974, 1985; Keefe, Brown, Wallston, & Caldwell, 1989; Rosenstiel & Keefe, 1983; Wilkie & Keefe, 1991). Examples of these strategies include various forms of distraction (e.g., reading, watching television), coping self-statements, reinterpretation of pain sensations, and selective inattention.

Another aspect of the cognitive dimension is related to the intactness of patients' cognition and its influence on their behavior and reporting of pain. Individuals with impaired cognition (e.g., learning problems, confusion, dementia) may be unable to describe their pain to others. Also, persons in early stages of cognitive development, such as infants, cannot describe their pain. Recently, investigators examined effects of pharmacologic therapies on cognitive function. Their work revealed that cognitive deficits occurred in patients with cancer pain when opioids were first prescribed or doses were adjusted upward. These deficits, however, were transient, and cognitive functioning returned to baseline after approximately two weeks on stable doses of opioids (Bruera, Macmillan, Hanson, & MacDonald, 1989; Sjogren & Banning, 1989). Thus, level and quality of cognition are part of the cognitive dimension of pain, and can certainly influence the ability of patients to report pain.

Knowledge is another important aspect of the cognitive dimension that is receiving increasing attention from researchers. Knowledge about pain and its treatment can affect responses to pain and various interventions. For example, Rimer, Levy, Keintz, Fox, Engstrom, and MacElwee (1987) demonstrated that with an educational intervention consisting of nurse counseling and printed materials, cancer patients with pain were more likely to have taken correct doses of analgesics on the correct schedule.

A number of descriptive studies addressed cognitive aspects of pain. Specific populations include general medical and surgical patients (Donovan, Dillon, & McGuire, 1987); postoperative patients (Fraser et al., 1989; Puntillo, 1990; Scott et al., 1983; Taenzer et al., 1986; Wallace, 1985); patients with gynecologic pain (Newton & Reading, 1980); and individuals with cancer pain (Ahles et al., 1983; Jacox & Stewart, 1973; McGuire, 1987a). While these studies elucidate some aspects of the cognitive dimension of pain, they are few in number and do not provide a comprehensive understanding of this dimension.

Behavioral Dimension

The behavioral dimension includes a variety of observable behaviors related to pain. Some behaviors are indicators of pain (Keefe, Brantley, Manuel, & Crisson, 1985) and may be reflexive or deliberate, while other behaviors are attempts to control pain (Wilkie & Keefe, 1991). Aspects of this dimension include overt manifestations of pain such as facial grimacing and other body movements, nonverbal vocal sounds such as moaning, and communicating with others about pain; pain control-related behaviors such as physical activity or inactivity, splinting or supporting

painful body parts, using medications, employing self-initiated interventions such as massage or mentholated ointments; and finally, other behavioral phenomena related to pain, such as sleep, rest, and fatigue.

Until recently, the literature was replete with anecdotes, but little research evidence supported the existence of this dimension. In the last few years, however, relevant studies have increased significantly. The behavioral dimension of pain has been studied in patients with general medical and surgical conditions (Donovan, Dillon, & McGuire, 1987; Volicer, 1978); acute postoperative pain (Burge et al., 1986; Carr, 1990; Fraser et al., 1989; Puntillo, 1990); gynecologic pain (Newton & Reading, 1980); and cancer pain (Ahles et al., 1983; Arathuzik, 1991; Barbour, McGuire, & Kirchhoff, 1986; Bond & Pilowsky, 1966; Donovan, 1985; Dorrepaal et al., 1989; Keefe et al., 1985; McGuire, 1984, 1987c; Wilkie & Keefe, 1991; Wilkie, Lovejoy, Dodd, & Tesler, 1988).

These studies reveal that some aspects of the behavioral dimension are extremely important in certain types of pain and pain syndromes but less important in others. For example, grimacing, moaning, splinting, and other indicators of pain are clear manifestations of acute postoperative pain, with implications for its assessment. In populations unable to provide self-reports of pain (e.g., the cognitively impaired or preverbal children), careful observation of behaviors becomes critical because these behaviors are the primary access to understanding pain in such populations. In other types of pain, for example, chronic cancer pain, behavioral indicators appear less important and salient than aspects of the dimension such as communication of pain and use of pain control behaviors. While some research reveals aspects of this dimension of pain that have relevance for both assessment and management, much is still unknown about its contribution to the phenomenon of pain and how individuals express and attempt to control it.

Sociocultural Dimension

Because pain does not exist outside of the sufferer's individual context, it has a sociocultural dimension comprised of demographic, ethnic, cultural, spiritual, religious, social, and related factors that influence pain perception and response. Individuals view their pain within their own time boundaries and often make somewhat stereotypical attributions about pain, for example, pain as punishment for past behaviors. In addition, various aspects of this dimension, such as social, ethnic, or racial background, may influence health care providers' assessment and management of pain, particularly when differences exist between sufferer and provider.

While a classic study of this dimension of pain in individuals of various ethnic backgrounds exists (Zborowski, 1952, 1969), and a considerable number of studies focused on experimentally induced pain (Wolff & Langley, 1975), knowledge about the socio-cultural dimension of pain in clinical pain syndromes is just emerging. Johnson addressed the idea of a “cultural construction” of pain, in which “...culture profoundly influences the experience of pain, quite apart from its neurologic basis.” (1989, p. 29).

Several aspects of this idea are supported by research. Specifically, findings from various studies revealed a strong role for culturally determined attitudinal factors in pain perception and response (Wolff & Langley, 1975); a subtle continuum of behaviors, attitudes, and feelings in relation to ethnicity and pain (Lipton & Marbach, 1984); culturally determined individual expressions of pain (Greenwald, 1991); cultural characteristics in some groups that have a strong influence on pain-related behaviors (Madjar, 1985; Reizian & Meleis, 1986); and finally, a strong familial influence on learning of pain behaviors (Edwards, Zeichner, Kuczmierczyk, & Boczkowski, 1985).

Specific aspects of the sociocultural dimension have been studied as well. Age, gender, and race appear to be important in the expression of pain (Miller & Shuter, 1984; Swanson & Maruta, 1980; Winefield et al., 1990). Studies of postoperative patients have included these variables (Melzack et al., 1987), as have studies on elderly individuals with myocardial infarction pain (Solomon et al., 1989) and cancer patients with pain (Arathuzik, 1991; Cleeland, Ladinsky, Serlin, & Thuy, 1988; Ferrell & Ferrell, 1988; McGuire, 1984; 1987a; McMillan, 1989).

Although this review is selective, findings indicate a strong sociocultural dimension in a number of painful conditions. Its relative importance to pain for different diseases and pain syndromes is still unknown. The salient components of this dimension of pain should be elucidated in order to better understand, assess, and manage pain in various populations. Finally, the influence of the sociocultural background of health care providers as contrasted with that of pain sufferers on pain assessment and management in the clinical area is not well understood, but may be extremely powerful in determining adequacy of pain management. The significant body of literature examining this issue is reviewed in the chapter on pain management practices.

Conclusion

The research evidence supporting this multidimensional conceptualization of the phenomenon of pain is strong, even though some dimensions are not well studied and much of the research is descriptive in nature. Research reveals the subjectivity of pain, and highlights the uniqueness that it holds for each sufferer. There is evidence that the multidimensional nature of pain is dynamic during the pain experience. Knowledge about the scope, significance, and relevance of each dimension to individuals with pain is incomplete, however, and the interactive nature of these dimensions remains to be elucidated. Thus, while this multidimensional perspective enhances understanding of pain, there is still much to be learned about its influence on the experience of pain.

Implications for Pain Assessment

The multidimensional conceptualization of pain has important implications for assessment, which is a process that aims to prevent pain if possible, detect it as soon as it occurs, and monitor it as interventions are implemented. The goal is to gather data that ultimately will be used to alleviate individuals' pain. The primary purposes of assessment are to: 1) identify individuals who have pain and those who are at risk of developing pain; 2) identify characteristics of pain; 3) establish a baseline of information that assists in selecting interventions; 4) evaluate the status of pain and effects of interventions on an on-going basis; and 5) help establish a therapeutic relationship with the individual who has pain. These purposes are achieved through various assessment activities that may occur singly, in combination, or sequentially.

The multidimensional conceptualization of pain used in this report provides guidance in the assessment of pain. Table 2.1 displays specific aspects of each dimension that may be assessed; those deemed most salient or critical to each dimension are highlighted. These critical aspects are pertinent to individuals with various types and syndromes of pain. They are easily measured using existing tools. Other aspects related to each dimension may be relevant to specific populations or painful conditions, and should be evaluated in such situations.

In selecting assessment tools, a useful approach is to consider the dimensions that need to be assessed. Unidimensional tools that assess pain intensity, pain relief, pain location, or other similar sensory aspects of pain are widely available and may be appropriate for simple, repetitive assessments. Other tools combine aspects from two or three separate dimensions, for example, pain intensity (sensory), re-

lief (cognitive), and distress (affective). Some tools are truly multidimensional, allowing assessment of sensory, affective, cognitive, behavioral, and other dimensions simultaneously. Tools available for assessing various dimensions of pain are described in several review papers (Donovan, 1987; Karoly, 1985; McGuire, 1988, 1992; Syrjala & Chapman, 1984) and are addressed more specifically in subsequent chapters.

Techniques for assessment of critical or salient aspects of each dimension may vary widely depending on patient population and purposes of assessment. In the physiologic dimension, for example, diagnostic tests may be necessary to determine the etiology of a "new" pain in a cancer patient, or a physical examination might be performed to assess the extent of anatomic involvement or structural or functional impairment due to pain. In the sensory dimension, aspects such as intensity and location can be assessed with self-reports complemented by physical examination. Assessment of the behavioral dimension may require direct observation, self-report, or use of a diary. Other dimensions, such as cognitive and sociocultural, are more difficult to assess but can be explored with individuals through structured or unstructured interviews.

Although all six dimensions are important, some may be more or less relevant to specific painful conditions and/or to specific populations. In each individual, or group of individuals with pain, the most relevant dimensions must be identified. For example, the physiologic and behavioral dimensions are particularly salient in preverbal infants and young children. In adults with acute postoperative pain, the sensory, affective, and behavioral dimensions are especially important, while for those who are cognitively impaired, the behavioral and physiological dimensions may be more salient.

Implications for Pain Management

The multidimensional conceptualization of the pain experience also has implications for pain management. The physical and emotional components that are embodied in the six dimensions illustrate the need for an interdisciplinary, multimodal approach to management. Two key points require emphasis. First, interventions should be individualized to meet the needs of the person experiencing pain based on the most salient, relevant dimensions of pain. Second, interventions must take into account a patient's personal preferences (Acute Pain Management Guidelines Panel, 1992).

A multimodal framework adapted from cancer pain literature is useful for exploring interdisciplinary management of pain (McGuire & Sheidler, 1990). As seen in Table 2.2, three broad approaches to managing pain are imperative: 1) treat the pathology underlying the pain (if known), 2) change the perception or sensation of pain, and 3) diminish the emotional reaction to pain. Within Table 2.2 are examples of appropriate interventions, with dimensions of pain specified that are addressed by the interventions. Because dimensions of pain are manifested differently in, and cause different problems for, each individual, a combination of interventions offers the most effective means of alleviating pain (Acute Pain Management Guideline Panel, 1992).

Clinical examples illustrate the importance of identifying the relevant dimensions of pain in a specific patient, selecting the most appropriate interventions, and evaluating critical outcomes. For example, in a person with acute postoperative pain, pharmacologic agents that change perception or sensation of pain (e.g., opioids) are the mainstay of treatment. However, nonpharmacologic strategies that diminish negative emotional responses to pain, such as relaxation and distraction, are helpful as well. Critical outcomes include decreased pain intensity and anxiety, increased pain relief, and perhaps earlier ambulation. In a patient with cancer, opioids may provide the most effective means of relieving pain, but a variety of cognitive and behavioral strategies that diminish negative emotional responses and/or change perception of pain also may contribute to pain relief. Outcomes might include decreased pain intensity, less depression, improved functional status, and better overall quality of life. In children, the acute pain of procedures such as bone marrow aspirations or lumbar punctures can be alleviated using medications and specific cognitive interventions that decrease anxiety and fear. Outcomes include decreased pain intensity, less emotional distress, increased perception of control, and increased cooperation with necessary medical procedures.

Both noninvasive, nonpharmacologic and pharmacologic interventions that diminish negative emotional responses to pain or change perceptions and sensations of pain lie within the purview of nursing practice. Even interventions involving treatment of underlying pathology (e.g., surgery, drug therapy) usually require nursing participation. Descriptions of nursing roles in pain relief abound in the clinical literature (Burckhardt, 1990; Donovan, 1990; Eland, 1990; McCaffery & Beebe, 1989; McGuire & Yarbro, 1987; Puntillo, 1991). Far less research focused on specific nurse-initiated interventions (e.g., comfort measures) or their contribution to relief when used in conjunction with pharmacologic therapy or surgery. Only one re-

cent volume (Funk et al., 1989) focuses on research-based management of pain by nurses.

In recent years, specific roles have been delineated for nurses in caring for individuals with pain. The report of the National Institutes of Health (NIH) Consensus Conference on the Integrated Management of Pain (1986) clearly identified the nurse as the key professional for facilitating communication about pain among health care providers. Additional activities recommended by NIH for nurses included assessing and monitoring pain; coordinating its management; and teaching patients, family members, and others. The Oncology Nursing Society, through its position paper on cancer pain (Spross, McGuire, & Schmitt, 1991), identified the following explicit role for nurses: "Nurses caring for individuals with cancer pain must exercise leadership in identifying and assessing cancer pain and in planning, implementing, coordinating, and evaluating the interdisciplinary management of cancer pain" (p. 15).

The coordinating role of nurses, and related responsibilities and accountability, have received little emphasis in nursing education programs. In addition, the influences of the clinical environment on nurses' pain management practices are understudied. These influences, including the idea of a pain management culture in clinical settings, may be powerful in determining adequacy of pain relief.

The multidimensional nature of pain, and the need for multimodal approaches to its management create complex and challenging clinical situations. As research-based knowledge about pain has expanded over the past few years, clinical knowledge has lagged behind, widening the disparity between research and practice. Studies document narrow, uninformed, and inadequate approaches to managing pain, approaches that rely on traditional, socially and politically "correct" models of behavior. Little evidence exists that health care providers understand pain as a multidimensional phenomenon or approach its assessment and management from that perspective. The ideas of "negotiated management" (L. A. Copp, personal communication, December 1991) and mutual goal setting in which persons with pain actively participate in planning and evaluating their care, remain underappreciated and underutilized by health care providers, including nurses.

Research Needs and Opportunities

While the multidimensional nature of pain is supported by a fairly extensive body of literature, many areas of research need and opportunity still exist. Each dimension of this conceptual perspective requires additional

study to more clearly delineate its associated components and emphasize their relevance to painful clinical conditions in various populations across the lifespan. The components then need further exploration as they relate to assessment and management of pain, and to positive or desirable patient outcomes.

In the physiological dimension of pain, much more needs to be learned about basic mechanisms of pain that can inform assessment and management. For example, can animal research on nociceptive fibers and opiate receptors be applied to humans through use of specific pharmacologic therapies tailored to the pathophysiology of pain? In addition, much more knowledge is needed about types of pain and pain syndromes in various populations; e.g., individuals with acquired immune deficiency syndrome.

The sensory dimension has been well described, but certainly additional research is needed to more clearly explicate location, intensity, and quality of pain in specific patient populations in whom pain has not been well studied. Because this dimension is the most salient one in clinical settings, there is also a need to explore the relationship of assessment information to selection of interventions and evaluation of patient outcomes.

The affective dimension only recently has become the focus of researchers, yet it is complex and probably extremely powerful in its influence on the experience of pain. Further characterization of this dimension in populations beyond those with acute, burn, and cancer pain is clearly needed, as is a better understanding of the influence of affect on pain, and vice versa. For example, what are the salient affective components in various pain conditions? How can they be assessed and treated? What outcomes are important?

The cognitive dimension of pain is supported by research addressing selected aspects in limited patient populations. Its reach, however, probably is far broader in scope than is currently realized. The multiple components that comprise this dimension in many types and syndromes of pain remain poorly elucidated, as do their implications for successfully assessing and managing pain, or evaluating outcomes.

The behavioral dimension is beginning to receive research attention. Long recognized for its role in demonstrating the presence of pain, this dimension is now credited with a role in controlling pain. The differentiation between behaviors that serve as indicators versus controllers of pain requires further exploration to substantiate its importance across patient populations of different developmental, clinical, and demographic backgrounds.

The sociocultural dimension of pain is least well understood. Research data generated from studies of experimentally induced pain cannot be extrapolated to clinical pain. Considerable effort is needed to describe salient components of this dimension in various patient populations. Subsequent research must first address assessment methodologies for these components, then focus on interventions and outcomes. For example, pain assessment tools that are culturally sensitive must be developed and tested, then their impact on collection, documentation, use, and efficacy in controlling pain must be explored. Treatment strategies that are culturally sensitive must also be developed and tested. Finally, the impact of different sociocultural backgrounds of patients and providers must be examined in relation to pain assessment and management in clinical settings.

The multidimensional conceptualization of pain postulates that the six dimensions are integrated and interactive. Yet their contribution as an integrated entity to individuals' experiences of pain has not been explored. Pain is an everchanging phenomenon, often dependent on underlying disease, therapy, and host factors. How does the relevance or importance of these six dimensions change over time in a particular patient? What are the effects of one dimension on another? Does the multidimensional framework in part or as a whole help reveal, explain, predict, or control changes that occur during the course of pain?

Pain clearly has been recognized as a phenomenon requiring multidimensional assessment (American Pain Society, 1991; Melzack, 1983; NIH, 1986; World Health Organization, 1986). The framework presented above has implications for assessing pain; but these have yet to be fully realized. Do existing multidimensional tools measure the salient components of dimensions, and are the tools clinically feasible? Do they provide useful information in assessing and/or managing pain as it changes over time? Does use of these tools result in improved patient outcomes?

In pain management, it is not yet clear whether the multidimensional conceptualization helps clinicians select more effective and complementary interventions. The multidimensional conceptualization of pain needs investigation with respect to multiple therapeutic strategies. As indicated in Table 2.2, many interventions target one or more dimensions of pain, but their influence on components within each dimension is not clear. In addition, when an intervention is initiated within one dimension, its contribution to another is unknown. For example, if an opioid analgesic is given to alleviate sensory aspects of acute postoperative pain, does it influence the affective dimension, and if so, how? The framework provides oppor-

tunities to design new interventions, or combinations of interventions, and test them through systematic research. Do multimodal therapeutic approaches based on a multidimensional conceptualization of pain result in improved patient outcomes across all six dimensions? What are positive or desirable outcomes?

Finally, is this multidimensional perspective valid in populations other than patients with cancer, in whom it was initially developed? Does this multidimensional conceptualization of pain contribute significantly to understanding the phenomenon of pain? Does the framework help clinicians approach the assessment and management of pain in a way that resolves the significant problem of undertreatment?

Recommendations

Based on the preceding assessment of research needs and opportunities related to the multidimensional conceptualization of pain and its implications for assessment and management, the following recommendations for research are made:

- Investigate the six dimensions of pain (physiological, sensory, affective, cognitive, behavioral, and sociocultural), exploring their individual components as well as the contribution of each dimension to pain as a dynamic process; focus in particular on the affective, cognitive, behavioral, and sociocultural dimensions with special attention to vulnerable populations.
- Determine the critical assessment components for each dimension and test across patient populations.
- Design and test strategies for management of pain that address the dimensions of pain, are multimodal and interdisciplinary in nature, influence the dimensions of pain in predicted directions, and result in positive patient outcomes.
- Determine appropriateness and adequacy of existing approaches for assessing the six dimensions of pain with particular attention to the needs of culturally diverse populations; develop tools to meet their needs if necessary.
- Test the dynamic interplay of the multidimensional nature of pain, assessment, management, and outcomes.

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